



Park vital signs monitoring

Taking the pulse of the national parks



Preserving the national parks unimpaired for the enjoyment of future generations is the fundamental purpose of the National Park Service. Park managers across the country are confronted with increasingly complex and challenging issues that require a broad-based understanding of park resources as a basis for making decisions, working with other agencies, and communicating with the public to protect park natural systems and native species. To provide park managers with the information they need the National Park Service has embarked on a new era of science-based management. An essential component of this strategy is park vital signs monitoring, a national effort to characterize and determine trends in the condition of park natural resources. When combined with an effective education program, monitoring results can contribute not only to park issues, but also to larger quality-of-life issues that affect surrounding communities and can contribute significantly to the environmental health of the nation.

A diver with the South Florida/Caribbean I&M Network monitors the condition of a coral reef at Biscayne National Park using an underwater video camera along a fixed transect. Photo by Tim Taylor, www.rvtiburon.com.

The scientifically sound information obtained through natural resource inventories and long-term ecological monitoring will have multiple applications for management decision-making, research, education, and promoting public understanding of park resources.



Scientists with the Heartland Monitoring Network conduct vegetation monitoring at Scotts Bluff National Monument, Nebraska.

Park vital signs

Park vital signs are selected physical, chemical, and biological elements and processes of park ecosystems that represent the overall health or condition of the park; they may also be park attributes that are highly valued by the public but not necessarily indicative of general park health. Vital signs monitoring is designed to inform managers of the condition of water, air, geologic resources, plants and animals, and the various ecological, biological, and physical processes that act on those resources. In situations where natural areas have been highly altered so that physical and biological processes no longer function naturally (e.g., fires and floods in developed areas), information obtained through monitoring can help managers understand how to develop the most effective approach to restoration or, in cases where restoration is impossible, ecologically sound management.

Program details

Under the program, more than 270 park units with significant natural resources have been organized into 32 I&M networks to facilitate baseline inventories and to conduct long-term resource monitoring. Each network links parks that share similar geographic and natural resource characteristics to improve efficiency and reduce costs. Parks within a network share funding and professional staff to avoid duplication of efforts. Because of funding restrictions, only the highest

priority vital signs, or those that are already funded by some other source, can be monitored initially.

The primary responsibilities of the small staff of the 32 I&M networks are to collect, manage, analyze and report long-term data for a modest set of vital signs (measurements of resource condition) and to effectively deliver data and information on resource condition to park managers, planners, interpreters, and other key audiences. Three key aspects of the I&M strategy are the leveraging of resources and expertise through integration and collaboration with other NPS programs and agencies, an interdisciplinary approach to compiling, analyzing, and reporting natural resource information, and an explicit link to park management and planning.

As of October 2007, all 32 networks (270 parks) have identified their vital signs of resource condition, and the first 23 networks (197 parks) have implemented operational monitoring of their highest-priority vital signs after completing their long-term monitoring plan. The remaining networks will all have implemented operational monitoring by the end of FY 2009. The 32 I&M networks have become a significant component of the overall scientific and information management infrastructure and expertise of the NPS. Network personnel are involved in numerous activities and functions such as organizing and

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cataloging data; performing data analysis, synthesis, and modeling; and providing data and expertise to park planners. Network personnel are also occasionally called upon to provide data and expertise for resource assessments and resource stewardship strategies, and to contribute to performance reporting. The I&M networks have become known as a key source and supplier of reliable, organized, and retrievable information about parks that was formerly unavailable, misplaced, or lost to managers and others who needed the information for sound decisions or sound science.

Recent accomplishments

Monitoring has become a cornerstone of natural resource management in the national parks, and the 32 networks are blazing the trail for a new era of science and condition-based resource management. Highlights from the first funded networks indicate the wide range of benefits derived from the program:

Early Warning—Monitoring of island fox populations, which detected a decline, and understanding ecological connections among 19th century ranching, feral pigs, alien fennel, DDT, bald eagles, golden eagles, and the foxes led to restoration efforts for the species in Channel Islands National Park, California.

Program Evaluation—Hydrological and ecological monitoring data at the Hatches Harbor salt marsh restoration site at Cape Cod National Seashore, Massachusetts, are being used to document the response of a degraded salt marsh ecosystem to reintroduction of tidal flow. Monitoring is used to quantify restoration success.

Adaptive Management—Park managers at five small prairie parks (Scotts Bluff, Pipestone, and Effigy Mounds National Monuments; Homestead National Monument of America; and Wilson's Creek National Battlefield) are using data from the monitoring program to gauge restoration success and modify restoration methods or prescribed fire regimes for prairie restoration.

Collaboration—The Northeast Temperate network helped to organize and fund an initiative to

use the Appalachian National Scenic Trail as an environmental monitoring mega-transect. The A.T. MEGA-Transect seeks to attract a wide range of participants, including citizen scientists, students, academic researchers, and others who are interested in using the trail as a large scale environmental laboratory. See (<http://www.appalachian-trail.org/megatransect>).

New Methods—The South Florida/Caribbean Monitoring Network, in partnership with the NASA Wallops Flight Facility and USGS Center for Coastal and Watershed Studies, is using LIDAR remote sensing technology to monitor sensitive coral reefs. The use of LIDAR data with strategic field measurements allowed park managers to complete measurements of coral colonies in a fraction of the time that would be required without this technology.

Majority of networks have begun operational monitoring

The vital signs monitoring networks are designing a system for scientific data collection, analysis, and reporting that is unprecedented in the history of the National Park Service. The program is very successful because of the explicit link to park management and planning and because it promotes efficient use of limited resources.

FY 2007 marks a significant milestone in that for the first time in the history of the National Park Service, all parks with significant natural resources now have in place the minimum staffing, funding, and data systems to routinely collect, manage, analyze and report long-term data for a modest set of vital signs, and to effectively deliver data and information on resource condition to park managers, planners, and other key audiences. As a direct result of the efficiencies gained through the network approach, all parks with significant natural resources have identified their vital signs, and the majority of parks can now provide "current condition" estimates for key measurements of the condition of high-priority natural resources.



(Above) Natural resource managers and staff with the Mid-Atlantic I&M Network conduct forest vegetation monitoring at Fredericksburg & Spotsylvania National Military Park.

(Below) Scientists from the USGS and Fire Island National Seashore collect Sediment Elevation Table (SET) data as part of the Northeast Coastal and Barrier I&M Network's salt marsh monitoring program.



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